PATENTS
Attorney Docket No. STE-023.01

REMARKS

By the foregoing amendments, Applicant has revised independent claim 1 to more clearly state the feature that the at least one welding parameter is altered to a value that is based on the difference between the actual and set curves. Support for this feature can be found at paragraphs 11 and 13 on page 3, lines 19-26 on page 7, and lines 2-8 on page 12 of the originally filed application. Applicant also revised independent claim 1 to improve the clarity of the claim language, and amended claim 11 to correct an antecedent problem. Additionally, Applicants has added new claims 16-30 which recite the feature that process parameters affecting welding are altered by a closed loop control mechanism that causes an actual time-dependent welding parameter curve to converge toward a set curve. Support for the claimed features of new independent claim 16 and its dependent claims can be found throughout the originally filed application, including, for example, at paragraph 8 on page 2, where the specification describes a closed loop control mechanism in which, based on the difference between an actual and set curves, one or more welding parameters are altered so that the actual curve approaches the set curve, and also at paragraphs 11 and 13 on page 3, lines 19-26 on page 7, and lines 2-8 on page 12. After these amendments, claims 1-30 are pending in the application.

The Examiner has rejected independent claim 1 and the claims that depend on it as defining subject matter obvious in view of U.S. Patent Nos. 4,631,685 to Peter, 5,855,706 to Grewell, and 4,818,313 to Sundberg. Applicant respectfully requests that the Examiner reconsider this rejection.

As Examiner knows, and based at least on MPEP 2143, a *prima facie* case of obviousness under 35 U.S.C. 103(a) requires (1) a suggestion or motivation in the references themselves or generally known in the art, to combine the references, (2) a reasonable expectation of success to combine, and (3) *a teaching, via the combination, of all the claimed limitations* [emphasis added].

Applicant's amended independent claim 1 discloses a method for ultrasonic welding that uses a closed feedback loop control mechanism. The method performs the weld by altering one or more welding process parameters to values that cause the time-dependent behaviour of some chosen welding parameter (e.g., the power level of the welding device) to converge toward a pre-chosen time-dependent behaviour of the same chosen parameter, that pre-chosen behaviour corresponding to a weld that was previously determined to be "good" (i.e., to have desired characteristics). Applicant recognized that by regulating the time-dependent behaviour of the chosen welding parameter to approach the previously-chosen time-dependent behaviour of that parameter, represented as a set curve, a "good" weld could once again be produced. Applicant's method implements the closed-loop control mechanism by comparing the current values of the chosen parameter at particular instances (e.g., comparing the power levels of the welding device at particular points of time) to the previously-chosen values corresponding to the "good" weld. If the values do not match, Applicant's method changes at least one welding process parameter, such as the amplitude of a sonotrode, to a value that depends on the difference between the current and predetermined values, and thereby causes the current time-dependent behaviour of the chosen parameter, as represented by an actual curve, to converge toward the pre-chosen

values on the set curve. Applicant's independent claim 1 thus discloses the feature that *depending on the existing difference between* [a] *set curve and* [an] *actual curve, at least one process parameter affecting welding is altered to a value based on that existing difference such that an equalization of set curve and actual curve occurs during further welding.*

By contrast, the prior art cited by the Examiner does not disclose closed-loop control mechanisms for regulating the performance of a weld, and certainly does not disclose implementing a closed-loop mechanism such that *depending on the existing difference between* [a] *set curve and* [an] *actual curve, at least one process parameter affecting welding is altered to a value based on that existing difference such that an equalization of set curve and actual curve occurs during further welding.*

Applicant agrees with the Examiner that Peter does not disclose "depending on the existing difference, at least one welding process parameter affecting welding being altered such that an equalization of the set curve and the actual curve occurs during further welding" [see page 3 of the Office Action]. Indeed, Peter's ultrasonic welding apparatus merely measures the surface displacement (measured from an initial trigger point) between plastic parts being fused, and then terminates the application of ultrasonic energy when the measured displacement reaches a pre-determined value (col. 5, lines 26-42). So while Peter's methodology involves comparing a predetermined constant value to a measured displacement value, Peter does not, in response to such comparisons, make any adjustments to any controllable parameters that effect the welding process, much less does Peter disclose

equalization of current time-dependent behaviour of a chosen parameter to the pre-chosen time-dependent behaviour of that parameter, as Applicant's claim 1 requires.

Grewell also teaches a regulated ultrasonic welding process. But unlike Applicant's independent claim 1, Grewell does not disclose that the welding process is regulated using a closed-loop mechanism in which *depending on the existing difference determined from the plurality of comparisons between* [a] *set curve and* [an] *actual curve, at least one process parameter affecting welding is altered to a value based on that existing difference such that an equalization of set curve and actual curve occurs during further welding.* Rather, Grewell's apparatus initially applies ultrasonic energy to the pieces being welded at an initial power level, and presses against the pieces with an initial engaging force (col. 9, lines 21-28). After a certain time period has elapsed, or in response to a change in the condition of the pieces (e.g., after a certain displacement threshold is reached), the level of applied ultrasonic energy, as well as the level of the engaging force applied to the pieces, is reduced to a pre-determined and set level (col. 9, lines 28-38). Subsequently, Grewell terminates the ultrasonic energy and engaging force applied to the pieces. Thus, Grewell changes the levels of applied ultrasonic energy and engaging force to discrete pre-determined values that do not depend on the results of any measurement or comparison such as, for example, the difference between a current and pre-chosen (set) curves representing the time-dependent behaviour of a chosen parameter. Nor does Grewell disclose or contemplate that a change to the level of ultrasonic energy and/or engaging force causes, or intends to cause, the equalization of the time-dependent behaviour of a chosen weld-related parameter to that of the corresponding pre-chosen behaviour, as Applicant's independent claim 1 requires.

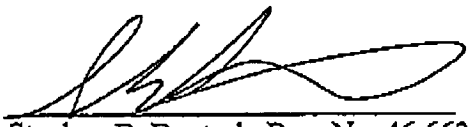
Sundberg too, unlike Applicant's independent claim 1, does not describe a closed-loop mechanism for adjusting a chosen time-dependent welding process parameter. Rather, Sundberg describes a mechanism for delivering a constant amount of energy to a sealing device before terminating the sealing operation. The Sundberg method controls the length of time the sealing device operates so that in response to a decrease in the power level delivered to the sealing device, the sealing device continues operating for a longer period of time, thereby delivering the same amount of energy that would have been delivered had the sealing device operated at a higher power level (col. 5, lines 2-8, and col. 6, line 62 to col. 7, line 3). So Sundberg does not at all adjust any welding-related parameters, but merely adjusts the time period during which the sealing device is operational. Sundberg, therefore, does not compare a chosen time-dependent welding-related parameter values, as represented by an actual curve, to the pre-chosen time-dependent behaviour of that same welding-related parameter, and does not seek to equalize the current time-dependent behaviour to the pre-chosen one. Thus, contrary to Applicant's independent claim 1, Sundberg does not teach *depending on the existing difference determined from the plurality of comparisons between* [a] *set curve and* [an] *actual curve, at least one process parameter affecting welding is altered to a value based on that existing difference such that an equalization of set curve and actual curve occurs during further welding.*

Accordingly, since the combined teaching of Peter, Grewell, and Sundberg does not teach *depending on the existing difference determined from the plurality of comparisons between* [a] *set curve and* [an] *actual curve, at least one process parameter affecting welding is altered to a value based on that existing difference such that an equalization of*

set curve and actual curve occurs during further welding, as recited in Applicant's independent claim 1, the Examiner fails to provide a *prima facie* case of obviousness for failing to show all the elements of the claimed invention in the combined teaching cited by the Examiner, as required by MPEP 2143. Applicant thus traverses Examiner's 35 U.S.C. 103(a) rejection of independent claim 1, and consider independent claim 1 to be allowable. Claims 2-15 are also allowable as depending from an allowable base claim.

Accordingly, Applicant asks that the Examiner reconsider and allow claims 1-15, and allow newly submitted claims 16-30.

Respectfully submitted,



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